

**ABSTRACT**

Improved cap assemblies which isolate materials in containers, e.g., bottles, vials, multi-vial trays, multi-well trays, etc., during processes while permitting vapor to pass into or out of the container, such as during freeze drying and the like, and facilitate subsequent closure of the container to cease such vapor passage (e.g., stoppering, etc.). The cap assembly optimizes containment of solute, prevents contamination, is easy to use and is readily compatible with validated industrial drying processes.

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